

Titles of Most Frequently Occurring Classifications of Patents Returned
From A Search of 09736822 on June 19, 2006

- 10 342/357.13 (3 OR, 7 XR)
 Class 342 : COMMUNICATIONS: DIRECTIVE RADIO WAVE SYSTEMS
 AND DEVICES
 342/350 DIRECTIVE
 342/352 .Including a satellite
 342/357.01 ..With position indicating
 342/357.06 ...Using Global Positioning Satellite (GPS or
 Glonass)
 342/357.13With storage device (i.e., map or database)
- 7 701/208 (1 OR, 6 XR)
 Class 701 : DATA PROCESSING: VEHICLES, NAVIGATION, AND
 RELATIVE LOCATION
 701/200 NAVIGATION
 701/207 .Employing position determining equipment
 701/208 ..For use in a map data base system
- 7 701/209 (2 OR, 5 XR)
 Class 701 : DATA PROCESSING: VEHICLES, NAVIGATION, AND
 RELATIVE LOCATION
 701/200 NAVIGATION
 701/207 .Employing position determining equipment
 701/208 ..For use in a map data base system
 701/209 ...Including route searching or determining
 device
- 5 342/357.09 (3 OR, 2 XR)
 Class 342 : COMMUNICATIONS: DIRECTIVE RADIO WAVE SYSTEMS
 AND DEVICES
 342/350 DIRECTIVE
 342/352 .Including a satellite
 342/357.01 ..With position indicating
 342/357.06 ...Using Global Positioning Satellite (GPS or
 Glonass)
 342/357.09 ...With transmission of location-indicative
 information to or from a remote station
- 5 342/357.1 (3 OR, 2 XR)
 Class 342 : COMMUNICATIONS: DIRECTIVE RADIO WAVE SYSTEMS
 AND DEVICES
 342/350 DIRECTIVE
 342/352 .Including a satellite
 342/357.01 ..With position indicating
 342/357.06 ...Using Global Positioning Satellite (GPS or
 Glonass)
 342/357.1Combined with telecommunication
- 5 701/210 (2 OR, 3 XR)
 Class 701 : DATA PROCESSING: VEHICLES, NAVIGATION, AND
 RELATIVE LOCATION
 701/200 NAVIGATION
 701/207 .Employing position determining equipment
 701/208 ..For use in a map data base system
 701/209 ...Including route searching or determining
 device
 701/210Route correction, modification, or
 verification

- 5 701/213 (0 OR, 5 XR)
 Class 701 : DATA PROCESSING: VEHICLES, NAVIGATION, AND
 RELATIVE LOCATION
 701/200 NAVIGATION
 701/207 .Employing position determining equipment
 701/213 ..Using Global Positioning System (GPS)
- 3 340/988 (0 OR, 3 XR)
 Class 340 : COMMUNICATIONS: ELECTRICAL
 340/988 VEHICLE POSITION INDICATION
- 3 340/990 (0 OR, 3 XR)
 Class 340 : COMMUNICATIONS: ELECTRICAL
 340/988 VEHICLE POSITION INDICATION
 340/989 .At remote location
 340/990 ..With map display
- 3 358/448 (0 OR, 3 XR)
 Class 358 : FACSIMILE AND STATIC PRESENTATION PROCESSING
 358/400 FACSIMILE
 358/443 .Specific signal processing circuitry
 358/448 ..Image processing
- 3 701/211 (0 OR, 3 XR)
 Class 701 : DATA PROCESSING: VEHICLES, NAVIGATION, AND
 RELATIVE LOCATION
 701/200 NAVIGATION
 701/207 .Employing position determining equipment
 701/208 ..For use in a map data base system
 701/211 ...Having audio or visual route guidance
- 2 340/995.12 (0 OR, 2 XR)
 Class 340 : COMMUNICATIONS: ELECTRICAL
 340/988 VEHICLE POSITION INDICATION
 340/995.1 .Map display
 340/995.12 ..Transmission of map data to vehicle
- 2 342/357.06 (0 OR, 2 XR)
 Class 342 : COMMUNICATIONS: DIRECTIVE RADIO WAVE SYSTEMS
 AND DEVICES
 342/350 DIRECTIVE
 342/352 .Including a satellite
 342/357.01 ..With position indicating
 342/357.06 ...Using Global Positioning Satellite (GPS or
 Glonass)
- 2 345/611 (0 OR, 2 XR)
 Class 345 : COMPUTER GRAPHICS PROCESSING, OPERATOR
 INTERFACE PROCESSING, AND SELECTIVE VISUAL DISPLAY
 SYSTEMS
 345/418 COMPUTER GRAPHICS PROCESSING
 345/581 .Attributes (surface detail or characteristic,
 display attributes)
 345/611 ..Anti-aliasing or image smoothing
- 2 348/47 (0 OR, 2 XR)
 Class 348 : TELEVISION
 348/42 STEREOSCOPIC
 348/46 .Picture signal generator
 348/47 ..Multiple cameras

- 2 351/205 (2 OR, 0 XR)

- Class 351 : OPTICS: EYE EXAMINING, VISION TESTING AND
CORRECTING
351/200 EYE EXAMINING OR TESTING INSTRUMENT
351/205 .Objective type
- 2 351/212 (0 OR, 2 XR)
Class 351 : OPTICS: EYE EXAMINING, VISION TESTING AND
CORRECTING
351/200 EYE EXAMINING OR TESTING INSTRUMENT
351/205 .Objective type
351/211 ..Including projected target image
351/212 ...For cornea curvature measurement
- 2 351/214 (0 OR, 2 XR)
Class 351 : OPTICS: EYE EXAMINING, VISION TESTING AND
CORRECTING
351/200 EYE EXAMINING OR TESTING INSTRUMENT
351/205 .Objective type
351/214 ..Including diaphragm or slit
- 2 358/451 (0 OR, 2 XR)
Class 358 : FACSIMILE AND STATIC PRESENTATION PROCESSING
358/400 FACSIMILE
358/443 .Specific signal processing circuitry
358/448 ..Image processing
358/451 ...Picture size conversion
- 2 358/530 (2 OR, 0 XR)
Class 358 : FACSIMILE AND STATIC PRESENTATION PROCESSING
358/500 NATURAL COLOR FACSIMILE
358/530 .Specific image-processing circuitry
- 2 382/106 (0 OR, 2 XR)
Class 382 : IMAGE ANALYSIS
382/100 APPLICATIONS
382/106 .Range or distance measuring
- 2 382/107 (0 OR, 2 XR)
Class 382 : IMAGE ANALYSIS
382/100 APPLICATIONS
382/107 .Motion or velocity measuring
- 2 382/154 (2 OR, 0 XR)
Class 382 : IMAGE ANALYSIS
382/100 APPLICATIONS
382/154 .3-D or stereo imaging analysis
- 2 382/242 (1 OR, 1 XR)
Class 382 : IMAGE ANALYSIS
382/232 IMAGE COMPRESSION OR CODING
382/242 .Contour or chain coding (e.g., Bezier)
- 2 382/278 (0 OR, 2 XR)
Class 382 : IMAGE ANALYSIS
382/276 IMAGE TRANSFORMATION OR PREPROCESSING
382/278 .Correlation
- 2 382/303 (0 OR, 2 XR)
Class 382 : IMAGE ANALYSIS
382/276 IMAGE TRANSFORMATION OR PREPROCESSING
382/302 .Multilayered image transformations

- 382/303 ..Pipeline processing
- 2 382/304 (0 OR, 2 XR)
 Class 382 : IMAGE ANALYSIS
 382/276 IMAGE TRANSFORMATION OR PREPROCESSING
 382/302 .Multilayered image transformations
 382/304 ..Parallel processing
- 2 700/228 (1 OR, 1 XR)
 Class 700 : DATA PROCESSING: GENERIC CONTROL SYSTEMS OR
 SPECIFIC APPLICATIONS
 700/90 SPECIFIC APPLICATION, APPARATUS OR PROCESS
 700/213 .Article handling
 700/228 ..Having particular transport between article
 handling stations
- 2 701/201 (2 OR, 0 XR)
 Class 701 : DATA PROCESSING: VEHICLES, NAVIGATION, AND
 RELATIVE LOCATION
 701/200 NAVIGATION
 701/201 .Determination of travel data based on the
 start point and destination point
- 2 701/202 (1 OR, 1 XR)
 Class 701 : DATA PROCESSING: VEHICLES, NAVIGATION, AND
 RELATIVE LOCATION
 701/200 NAVIGATION
 701/201 .Determination of travel data based on the
 start point and destination point
 701/202 ..Route pre-planning
- 2 701/214 (0 OR, 2 XR)
 Class 701 : DATA PROCESSING: VEHICLES, NAVIGATION, AND
 RELATIVE LOCATION
 701/200 NAVIGATION
 701/207 .Employing position determining equipment
 701/213 ..Using Global Positioning System (GPS)
 701/214 ...Means to improve accuracy of position or
 location
- 2 707/104.1 (2 OR, 0 XR)
 Class 707 : DATA PROCESSING: DATABASE AND FILE
 MANAGEMENT OR DATA STRUCTURES
 707/100 DATABASE SCHEMA OR DATA STRUCTURE
 707/104.1 .Application of database or data structure
 (e.g., distributed, multimedia, image)
- 2 707/3 (0 OR, 2 XR)
 Class 707 : DATA PROCESSING: DATABASE AND FILE
 MANAGEMENT OR DATA STRUCTURES
 707/1 DATABASE OR FILE ACCESSING
 707/3 .Query processing (i.e., searching)
- 2 715/505 (0 OR, 2 XR)
 Class 715 : DATA PROCESSING: PRESENTATION PROCESSING OF
 DOCUMENT
 715/500 PRESENTATION PROCESSING OF DOCUMENT
 715/505 .Form
- 2 715/529 (0 OR, 2 XR)
 Class 715 : DATA PROCESSING: PRESENTATION PROCESSING OF
 DOCUMENT
 715/500 PRESENTATION PROCESSING OF DOCUMENT

715/526 .Display processing
 715/529 ..Text attribute

- 2 715/531 (0 OR, 2 XR)
 Class 715 : DATA PROCESSING: PRESENTATION PROCESSING OF
 DOCUMENT
 715/500 PRESENTATION PROCESSING OF DOCUMENT
 715/530 .Edit, composition, or storage control
 715/531 ..Text
- 2 715/539 (0 OR, 2 XR)
 Class 715 : DATA PROCESSING: PRESENTATION PROCESSING OF
 DOCUMENT
 715/500 PRESENTATION PROCESSING OF DOCUMENT
 715/530 .Edit, composition, or storage control
 715/539 ..Block control
- 2 715/541 (0 OR, 2 XR)
 Class 715 : DATA PROCESSING: PRESENTATION PROCESSING OF
 DOCUMENT
 715/500 PRESENTATION PROCESSING OF DOCUMENT
 715/530 .Edit, composition, or storage control
 715/541 ..Handwritten textual input

09736822_CLS.txt
Most Frequently Occurring Classifications of Patents Returned
From A Search of 09736822 on June 19, 2006

Original Classifications

3 342/357.09
3 342/357.1
3 342/357.13
2 351/205
2 358/530
2 382/154
2 701/201
2 701/209
2 701/210
2 707/104.1

Cross-Reference Classifications

7 342/357.13
6 701/208
5 701/209
5 701/213
3 340/988
3 340/990
3 358/448
3 701/210
3 701/211
2 340/995.12
2 342/357.06
2 342/357.09
2 342/357.1
2 345/611
2 348/47
2 351/212
2 351/214
2 358/451
2 382/106
2 382/107
2 382/278
2 382/303
2 382/304
2 701/214
2 707/3
2 715/505
2 715/529
2 715/531
2 715/539
2 715/541

Combined Classifications

10 342/357.13
7 701/208
7 701/209
5 342/357.09
5 342/357.1
5 701/210
5 701/213
3 340/988
3 340/990
3 358/448
3 701/211
2 340/995.12
2 342/357.06
2 345/611

2 348/47
2 351/205
2 351/212
2 351/214
2 358/451
2 358/530
2 382/106
2 382/107
2 382/154
2 382/242
2 382/278
2 382/303
2 382/304
2 700/228
2 701/201
2 701/202
2 701/214
2 707/104.1
2 707/3
2 715/505
2 715/529
2 715/531
2 715/539
2 715/541

US-PAT-NO: 6975939

DOCUMENT-IDENTIFIER: US 6975939 B2

TITLE: Mapping patterns of movement based on the aggregation of spatial information contained in wireless transmissions

DATE-ISSUED: December 13, 2005

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Edwards; Daniel L.	Manassas	VA	N/A	N/A
Simpson; R. Justin	Bethesda	MD	N/A	N/A

ASSIGNEE INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
The United States of America as represented by the Secretary of the Army	Washington	DC	N/A	N/A	02

APPL-NO: 10/206757

DATE FILED: July 29, 2002

INT-CL-ISSUED: [07] G01S003/02, H04Q007/22

US-CL-ISSUED: 701/209, 701/208, 701/214, 455/456.1, 455/456.3

US-CL-CURRENT: 701/209, 455/456.1, 455/456.3, 701/208, 701/214

FIELD-OF-CLASSIFICATION-SEARCH: 701/200; 701/201; 701/208; 701/209; 701/214

See application file for complete search history

REF-CITED:

U.S. PATENT DOCUMENTS



US06975939B2

(12) United States Patent
Edwards et al.

(10) Patent No.: US 6,975,939 B2
(45) Date of Patent: Dec. 13, 2005

(54) MAPPING PATTERNS OF MOVEMENT BASED ON THE AGGREGATION OF SPATIAL INFORMATION CONTAINED IN WIRELESS TRANSMISSIONS

6,975,939 B2 * 6/2002 Dick et al. 702/150
6,020,620 B1 6/2002 Liu et al. 2001,0007699 A1 7/2000 Wilson et al.
2001,0095908 A1 10/2003 Mehl et al. 455/456.3

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Burgess, D. A., Supporting Baseband Positioning Technology in a GSM Network, Rosen Corp., Redwood City, CA 94063 Mar. 19, 2002, pp. 1-6.
Rabinovich, M and J. Sallust, Positioning Using the ATSC Digital Television Signal, Rosen Corp., undated pp. 1-16.

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 682 days.

(21) Appl. No.: 10/206757

(22) Filed: Jul. 29, 2002

(65) Prior Publication Data

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(52) U.S. Cl. 701/209; 701/208; 701/214; 455/456.1; 455/456.3

(53) Field of Search 701/200, 201, 701/208, 209, 214

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5,299,132 A * 3/1994 Warden 701/214
5,335,194 A * 6/1999 Tibbet et al. 701/214
5,038,371 A * 6/1999 Desjardins 701/213
6,128,501 A * 10/2000 Fletcher-Jones 455/456.3
6,150,961 A 11/2000 Albrecht et al.

ABSTRACT

Time-tagged coordinates from wireless-unique transmissions of wireless devices are collected routinely and stored for later analysis. From this data, one may derive a sequence of wireless device operation from which a dense aggregate pattern (900) is formed over a geographic area. Aggregate data is sorted into ranges representing speed of movement and then converted to places representing cells (401) in an aggregate matrix (400). Heavily weighted values (402) are assigned to cells (401) that represent a location within a pre-specified spatial error (100) about a data point (101). Lower values are assigned to cells (401) representing paths (900) or corridors, connecting these better-defined locations. As more transmission sessions (300) are added to the matrix (400), the largest weight values (402) cluster as individual cells (401) representing a most likely path (1001). Thus precise topographic attributes may be derived based on these spatial clusters (FIG. 12A), overlapping paths connecting them (1001), or combinations (FIG. 13A) thereof.

27 Claims, 14 Drawing Sheets

